

Radiation Report on **OP200AZMDA (DC: 2C0347G)**
Project: AIM

A radiation evaluation was performed on **The OP200AZMDA , aDual Low Offset, Low Power Operational Amplifier (Analog Devices)** to determine the total dose tolerance of these parts. The total dose testing was performed using a Co^{60} gamma ray source. During the radiation testing, five devices were irradiated under bias, see figure 1. One part was used as a control sample,. The total dose radiation levels were 1, 5, 10, 15, and 20kRads(Si). The average dose rate was 3.77 rads(Si)/min. After the 20krad(Si) irradiation, the parts were annealed under bias at 25°C for 168 hours. After each radiation exposure and annealing treatment, parts were electrically tested according to the test conditions and the specification limits listed in Table III. An executive summary of the test results is provided below in bold, followed by a detailed summary of the test results after each radiation level and annealing step.

All parts passed all parametric tests up to and including 5krad(Si). All devices exceeded the manufacturers specified maximum of 2nA at 20krad(Si), by an average of 0.73 nA. All devices recovered after a 168 hour biased room temperature anneal.

At 10krad(Si) all devices exceeded the manufacturer's maximum datasheet limit of 1nA for input offset current by an average of 1.8nA.

Initial electrical measurements were made on 6 samples. Five samples were irradiated (1, 2, 3, 4, 5)) and device number C was used as a control sample, but due to an oversight of the test engineer, the control device was only characterized prior to radiation. All devices had the following external markings on the package: AMP200; 5962-8859301MPA; 2C0347G

Initial electrical measurements were made on 6 samples. five samples were irradiated (1, 2, 3, 4, 5)) and device number 6 was used as a control sample, but due to an oversite of the test engineer, the control device was only tested at the pre radiation step. All devices had the following external markings on the package: AMP200; 5962-8859301MPA; 2C0347G

All parts passed all parametric tests up to and including 5krad(Si)

Table III provides a summary of the test results with the mean and standard deviation values for each parameter after each irradiation exposure and annealing step.

TABLE I. Part Information

Generic Part Number:	AMP200
Full Part Number	5962-8859301MPA
Manufacturer:	Analog Devices
Lot Date Code (LDC):	2C0347G
Quantity Tested:	6
Serial Numbers of Control Sample:	
Serial Numbers of Radiation Samples:	1, 2, 3, 4, 5
Part Function:	OPAMP
Part Technology:	Bipolar
Package Style:	8 pin dip
Test Equipment:	HP4156B Precision Semiconductor Parameter Analyzer; HP E3611A DC Power Supply
Test Engineer:	C. Palor / A. Pham

* The manufacturer for this part guaranteed no radiation tolerance/hardness.

TABLE II. Radiation Schedule for OP200AZMDA

EVENT	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	01/04/05
2) 1 KRAD IRRADIATION (14 RADS (Si)/MIN)	1/4/2005
POST-1 KRAD ELECTRICAL MEASUREMENT	1/4/2005
3) 5 KRAD IRRADIATION (93 RADS (Si)/MIN)	1/4/2005
POST-5 KRAD ELECTRICAL MEASUREMENT	1/4/2005
4) 10 KRAD IRRADIATION (4.9 RADS (Si)/MIN)	1/5/2005
POST-10 KRAD ELECTRICAL MEASUREMENT	1/5/2005
5) 15 KRAD IRRADIATION (114 RADS (Si)/MIN)	1/5/2005
POST-15 KRAD ELECTRICAL MEASUREMENT	1/5/2005
6) 20 KRAD IRRADIATION (114 RADS (Si)/MIN)	1/5/2005
POST-20 KRAD ELECTRICAL MEASUREMENT	
Average Dose Rate = 3.77rads (Si)/min	

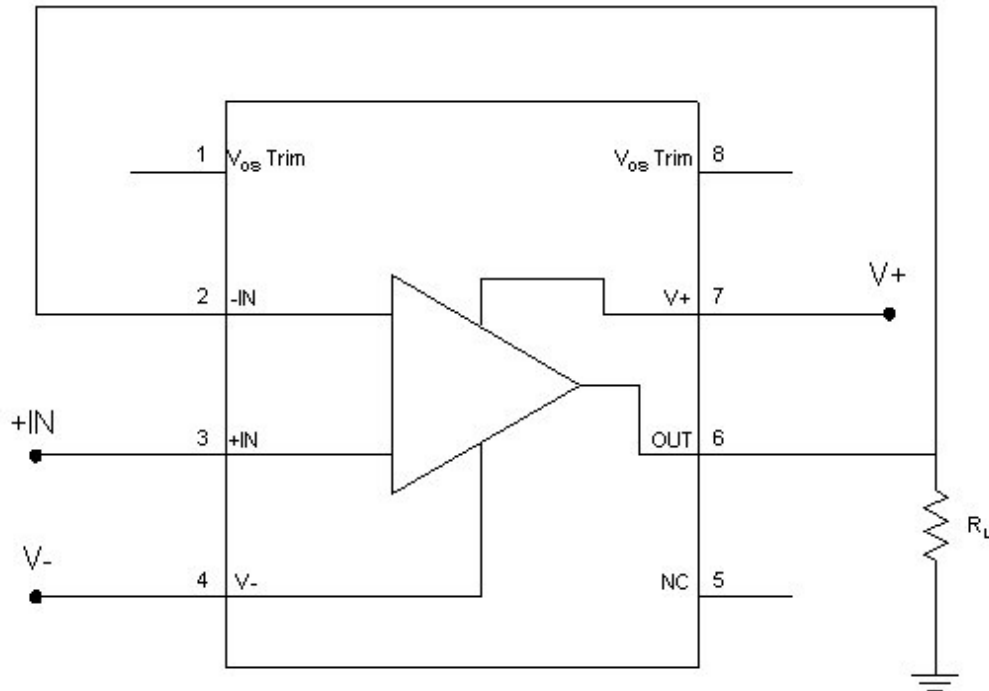


Figure 1. OP200AZMDA Bias Circuit

Table III. Electrical Characteristics OP200AZMDA

Test Parameters							Initial		Total Dose Exposure												Annealing	
									1krad(Si)		5krad(Si)		10krad(Si)		15krad(Si)		20krad(Si)		168 hours			
																			@ 25° C			
#	Name	Symbol	Condition	Units	min	max	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd	mean	sd		
1	Bias Current	+IB	VS = ±15 V, TA = 25C, V _{CM} = 0 V	nA	--	2.00	-0.13	0.03	-0.29	0.08	-0.78	0.07	-0.59	0.13	0.29	0.18	0.19	0.22	1.92E-01	2.15E-01		
2	Bias Current	-IB	VS = ±15 V, TA = 25C, V _{CM} = 0 V	nA	--	2.00	-0.11	0.06	-0.42	0.12	-1.39	0.09	-2.17	0.22	-2.51	0.15	-1.99	0.34	-1.83	1.31E-01		
3	Input Offset Current	I _{IO}	VS = ±15 V, TA = 25C, V _{CM} = 0 V	A	--	1.00	-0.03	0.02	0.13	0.06	0.61	0.09	1.58	0.22	2.80	0.33	4.72	0.56	2.02	0.30		
4	Input Offset Voltage	+V _{IO}	VS = ±15 V, TA = 25C	mV	--	75.00	-70.00	40.82	-50.00	0.00	-50.00	0.00	-70.00	44.72	-50.00	0.00	-50.00	0.00	-10.00	54.77		
5	Swing Voltage	V _{SWING}	VS = 15 V, R _L = 2 k?	V	±11	--	±14.0	1.57E-02	±14.0	8.52E-03	±14.0	1.37E-02	±14.0	6.20E-03	±14.1	6.66E-03	±14.1	9.56E-03	±0.13	4.58E-03		